

WHAT IS CLAIMED IS:

1. A system for providing voice communications between an end terminal in a packet data network and a wireless communication device, comprising:
 - a packet communication supporting subsystem communicating with the packet data network, the packet communication supporting subsystem operating to locate the wireless communication device;
 - a base station subsystem communicating with the wireless communication device and the packet communication supporting subsystem, the packet communication supporting subsystem communicating data packets between the base station subsystem and the packet data network; and
 - a Voice-over-Internet-Protocol Mobile Switching Center ("VMSC") communicating with the packet communication supporting subsystem through a packet-switched network and communicating with the base station subsystem through a circuit-switched network.
2. The system as claimed in claim 1, wherein a network communicating between the packet data network and the wireless communication device implements General Packet Radio Service ("GPRS").
3. The system as claimed in claim 2, wherein the packet communication supporting subsystem includes a Gateway GPRS Support Node ("GGSN") and a Serving GPRS Support Node ("SGSN"), the GGSN communicates with the packet

data network, and the SGSN communicates with the GGSN and the VMSC.

4. The system as claimed in claim 1, wherein the base station subsystem includes a Base Station Controller and a Base Transceiver Station, the BSC communicates with the packet communication supporting subsystem through a base station Packet Control Unit, and the BTS communicates with the wireless communication device.
5. The system as claimed in claim 1, wherein the VMSC includes a vocoder and a Packet Control Unit ("PCU") communicating with the vocoder, the vocoder communicates with the circuit-switched network to receive voice signals from or submit voice signals to the base station subsystem, and the PCU communicates with the packet-switched network to receive voice packets from or submit voice packets to the packet communication supporting subsystem.
6. The system as claimed in claim 5, wherein the vocoder compresses digitized data stream into compressed data signals and the PCU transmits the voice signals in packet form, and the PCU receives voice signals in packet form and the vocoder decompresses the compressed data signals into digitized data stream.
7. The system as claimed in claim 1, wherein the wireless communication device is a mobile phone and the end terminal is a H.323 terminal.

8. The system as claimed in claim 1, wherein the system implements a registration method comprising:

- performing a location update of the wireless communication device;
- authenticating the identity of the wireless communication device;
- performing a ciphering procedure for the wireless communication device;

- notifying the VMSC of the registration of the wireless communication device;
- activating the communication between the VMSC and the packet data

network;

- performing a registration of the wireless communication device to the packet data network;

- notifying the wireless communication device of the completion of location update.

9. The system as claimed in claim 1, wherein the system implements a call-making method comprising:

- performing channel assignment, authentication, and ciphering setup procedures for the wireless communication device;

- performing a call setup procedure for the wireless communication device;
- establishing a voice communication channel between the VMSC and the packet data network;

- alerting the end terminal and the wireless communication device;

- connecting the end terminal and the wireless communication device through

the VMSC; and

performing a Packet Data Protocol ("PDP") context activation procedure to create a voice PDP context.

10. The system as claimed in claim 1, wherein the system implements a call-releasing method comprising:

disconnecting voice communications by the wireless communication device and sending a release signal to the end terminal by the VMSC;
exchanging disengage requests between the VMSC and the end terminal; and
performing a voice PDP context deactivation procedure.

11. The system as claimed in claim 1, wherein the system implements a call-receiving method comprising:

establishing a voice communication channel between the VMSC and the end terminal;
paging the wireless communication device;
performing channel assignment, authentication, and ciphering setup procedures for the wireless communication device upon receiving a response from the wireless communication device;
performing a call setup procedure for the wireless communication device;
alerting the wireless communication device and alerting the end terminal in the packet data network;

connecting the end terminal and the wireless communication device through the VMSC; and

activating voice communications for the wireless communication device by the VMSC.

12. A system for providing Voice-over-Internet-Protocol service between a H.323 terminal in a packet data network and a mobile phone in a network implementing General Packet Radio Service ("GPRS"), comprising:

a packet communication supporting subsystem communicating with the packet data network, the packet communication supporting subsystem operating to locate the mobile phone, the packet communication supporting subsystem comprising a Gateway GPRS Support Node ("GGSN") and a Serving GPRS Support Node ("SGSN"), the GGSN communicating with the packet data network, the SGSN communicating with the GGSN;

a base station subsystem communicating with the mobile phone and the SGSN, the packet communication supporting subsystem communicating data packets between the base station subsystem and the packet data network, the base station subsystem including a Base Station Controller ("BSC") and a Base Transceiver Station ("BTS"), the BSC communicating with the SGSN through a base station Packet Control Unit, the BTS communicating with the mobile phone; and

a VoIP Mobile Switching Center ("VMSC") communicating with the SGSN through a packet-switched network and communicating with the BSC through a

circuit-switched network, the VMSC including a vocoder and a Packet Control Unit ("PCU") communicating with the vocoder, the vocoder communicating with the circuit-switched network to receive voice signals from or submit voice signals to the BSC, the PCU communicating with the SGSN to receive voice packets from or submit voice packets to the packet communication supporting subsystem.

13. A registration method for providing voice communications between a wireless communication device and an end terminal in a packet data network, comprising:
 - performing a location update of the wireless communication device;
 - authenticating the identity of the wireless communication device;
 - performing a ciphering procedure for the wireless communication device;
 - notifying a Voice-over-Internet-Protocol Mobile Switching Center ("VMSC") of the registration of the wireless communication device, the VMSC communicating with the wireless communication device through a circuit-switched network and communicating with the end terminal through a packet-switched network;
 - activating a communication between the VMSC and the packet data network;
 - performing a registration of the wireless communication device to the packet data network;
 - notifying the wireless communication device of the completion of location update.

14. The registration method as claimed in claim 13, wherein a network communicating between the packet data network and the wireless communication device implements General Packet Radio Service ("GPRS").

15. The registration method as claimed in claim 13, wherein an activation of the communication between the VMSC and the packet data network comprises:

initiating a new Packet Data Protocol ("PDP") context by the VMSC;
establishing a record for the wireless communication device by a Gateway GPRS Support Node ("GGSN"), the GGSN communicating with the packet data network through a gatekeeper ("GK") and with the VMSC through a supporting Serving GPRS Support Node ("SGSN"); and
enabling an Internet-Protocol communication between the GK and the VMSC.

16. The registration method as claimed in claim 13, wherein the registration of the wireless communication device to the packet data network comprises:

initiating the registration and notifying a gatekeeper ("GK") of the packet data network, by the VMSC, with an alias address and a transport address;
creating a record by the GK for the mobile phone containing corresponding information of a mobile phone number to an IP address;
notifying the VMSC of the completion of the registration by the GK; and
establishing Mobility Management and a Packet Data Protocol context by the VMSC and storing the context in a mobile phone record of the VMSC.

17. The registration method as claimed in claim 13, wherein the wireless communication device is a mobile phone and the end terminal is a H.323 terminal.

18. A registration method for providing Voice-over-Internet-Protocol service between a H.323 terminal in a packet data network and a mobile phone in a network implementing General Packet Radio Service ("GPRS"), comprising:

- performing a location update of the mobile phone;
- authenticating the identity of the mobile phone;
- performing a ciphering procedure for the mobile phone;
- notifying a Voice-over-Internet-Protocol Mobile Switching Center ("VMSC") of the registration of the mobile phone, the VMSC communicating with the mobile phone through a circuit-switched network and with the H.323 terminal through a packet-switched network;
- activating a communication between the VMSC and the packet data network, an activation of the communication comprising:
 - initiating a new Packet Data Protocol ("PDP") context by the VMSC;
 - establishing a record for the mobile phone by a Gateway GPRS Support Node ("GGSN"), the GGSN communicating with the packet data network through a gatekeeper ("GK") and with the VMSC through a supporting Serving GPRS Support Node ("SGSN"); and
 - enabling an Internet-Protocol ("IP") communication between the GK and the VMSC;

performing a registration of the mobile phone to the packet data network, comprising:

initiating the registration by the VMSC and notifying a gatekeeper ("GK") of the packet data network with an alias address and a transport address by the VMSC;

creating a record by the GK for the mobile phone containing corresponding information of a mobile phone number to an IP address;

notifying the VMSC of the completion of the registration by the GK;

and

establishing Mobility Management and a PDP context by the VMSC and storing the context in a mobile phone record of the VMSC; and

notifying the mobile phone of the completion of location update.

19. A call-making method for a wireless communication device to activate voice communications with an end terminal in a packet data network, comprising:

performing channel assignment, authentication, and ciphering setup procedures for the wireless communication device;

performing a call setup procedure for the wireless communication device;

establishing a voice communication channel between a Voice-over-Internet Protocol Mobile Switching Center ("VMSC") and the packet data network, the VMSC communicating with the wireless communication device through a circuit-switched network and with the end terminal through a packet-switched network;

alerting the end terminal and the wireless communication device;
connecting the end terminal and the wireless communication device through
the VMSC; and
performing a Packet Data Protocol ("PDP") context activation procedure to
create a voice PDP context.

20. The call-making method as claimed in claim 19, wherein a network
communicating between the packet data network and the wireless communication
device implements General Packet Radio Service.

21. The call-making method as claimed in claim 19, wherein the step of
establishing the voice communication channel between the VMSC and the packet
data network comprises:
providing the Internet-Protocol address of the end terminal to the VMSC by a
gatekeeper ("GK") of the packet data network;
communicating with the end terminal by the VMSC to exchange setup and
call-proceeding signals between the VMSC and the end terminal; and
transmitting Registration, Admission and Status ("RAS") Admission Request
("ARQ") signals to the GK and requesting communications by the end terminal.

22. The call-making method as claimed in claim 19, wherein the wireless
communication device is a mobile phone and the end terminal is a H.323 terminal.

23. A call-making method for a mobile phone in a network implementing General Packet Radio Service to activate Voice-over-Internet-Protocol communications with a H.323 terminal in a packet data network, comprising:

performing channel assignment, authentication, and ciphering setup procedures for the mobile phone;

performing a call setup procedure for the mobile phone;

establishing a voice communication channel between a Voice-over-Internet-Protocol Mobile Switching Center ("VMSC") and the packet data network, comprising:

providing the Internet-Protocol address of the H.323 terminal to the VMSC by a gatekeeper of the packet data network;

communicating with the H.323 terminal by the VMSC to exchange setup and call-proceeding signals between the VMSC and the H.323 terminal; and

transmitting Registration, Admission and Status Admission Request signals to the gatekeeper and requesting communications by the end terminal, wherein the VMSC communicates with the mobile phone through a circuit-switched network and with the H.323 terminal through a packet-switched network;

alerting the H.323 terminal and the mobile phone;

connecting the H.323 terminal and the mobile phone through the VMSC; and

performing a Packet Data Protocol ("PDP") context activation procedure to

create a voice PDP context.

24. A call-releasing method for terminating voice communications between a wireless communication device and an end terminal in a packet data network, comprising:

disconnecting voice communications by the wireless communication device and sending a release signal to the end terminal by a Voice-over-Internet-Protocol Mobile Switching Center ("VMSC") communicating with the wireless communication device through a circuit-switched network and with the end terminal through a packet-switched network;

exchanging disengage requests between the VMSC and the end terminal; and
performing a deactivation procedure.

25. The call-releasing method as claimed in claim 24, wherein a network communicating between the packet data network and the wireless communication device implements General Packet Radio Service.

26. The call-releasing method as claimed in claim 24, wherein the wireless communication device is a mobile phone and the end terminal is a H.323 terminal.

27. A call-releasing method for terminating voice communications between a mobile phone in a network implementing General Packet Radio Service and a H.323 terminal in a packet data network, comprising:

disconnecting voice communications by the wireless communication device and sending a release signal to the end terminal by a Voice-over-Internet-Protocol Mobile Switching Center ("VMSC") communicating with the wireless communication device through a circuit-switched network and with the end terminal through a packet-switched network;

exchanging disengage requests between the VMSC and the end terminal; and performing a deactivation procedure.

28. A call-receiving method allowing a wireless communication device to receive voice communications initiated by an end terminal in a packet data network, comprising:

establishing a voice communication channel between a Voice-over-Internet-Protocol Mobile Switching Center ("VMSC") and the end terminal, the VMSC communicating with the wireless communication device through a circuit-switched network and with the end terminal through a packet-switched network;

paging the wireless communication device;

performing channel assignment, authentication, and ciphering setup procedures for the wireless communication device upon receiving a response from the wireless communication device;

performing a call setup procedure for the wireless communication device;
alerting the wireless communication device and alerting the end terminal;
connecting the end terminal and the wireless communication device through
the VMSC;

performing a Packet Data Protocol ("PDP") context activation procedure to
create a voice PDP context; and

activating voice communications for the wireless communication device by
the VMSC.

29. The call-receiving method as claimed in claim 28, wherein a network
communicating between the packet data network and the wireless communication
device implements General Packet Radio Service.

30. The call-receiving method as claimed in claim 28, wherein establishing the
voice communication channel comprises:

performing Registration, Admission and Status ("RAS"), Admission Request
("ARQ") and setup procedures, wherein the end terminal transmits a RAS admission
request signal to a gatekeeper of the packet data network, which contains the identity
of the wireless communication device, and the gatekeeper responds to the end
terminal with a RAS admission confirmation signal;

sending a setup signal to the VMSC by the end terminal;

responding to the end terminal with a call proceeding signal by the VMSC;

and

exchanging RAS admission request and admission confirmation signals between the VMSC and the gatekeeper.

31. The call-receiving method as claimed in claim 28, wherein the wireless communication device is a mobile phone and the end terminal is a H.323 terminal.

32. A call-receiving method allowing a mobile phone in a network implementing General Packet Radio Service to receive voice communications initiated by a H.323 terminal in a packet data network, comprising:

establishing a voice communication channel between a Voice-over-Internet-Protocol Mobile Switching Center ("VMSC") and the H.323 terminal, the VMSC communicating with the mobile phone through a circuit-switched network and with the H.323 terminal through a packet-switched network, the step of establishing a voice communication channel comprising:

performing Registration, Admission and Status ("RAS") admission request and setup procedures, wherein the H.323 terminal transmits a RAS admission request signal to a gatekeeper ("GK") of the packet data network, which contains the identity of the mobile phone, and the GK responds to the H.323 terminal with a RAS admission confirmation signal;

sending a setup signal to the VMSC by the H.323 terminal;

responding to the H.323 terminal with a call proceeding signal by the VMSC; and

exchanging RAS admission request and admission confirmation signals between the VMSC and the GK;

paging the mobile phone;

performing channel assignment, authentication, and ciphering setup procedures for the mobile phone upon receiving a response from the mobile phone;

performing a call setup procedure for the mobile phone;

alerting the mobile phone and alerting the H.323 terminal;

connecting the H.323 terminal and the mobile phone through the VMSC; and

activating voice communications for the mobile phone by the VMSC.

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